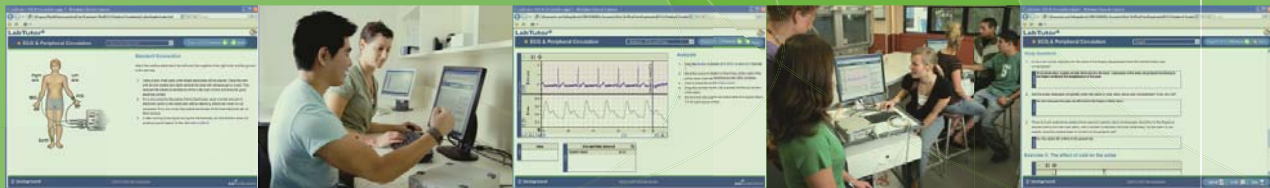


LabTutor Case Study



Client: Dalhousie University, Halifax, Canada

Situation: The Department of Pharmacology wanted to replace their traditional polygraphs and offer a full spectrum of Introductory to Pharmacology exercises for their senior undergraduate and graduate courses that can be created and modified using LabAuthor.

Solution: PowerLab LabTutor and LabAuthor Systems

PowerLab LabTutor Systems Engage Students in Learning and Generating Lab Reports

For their 2009 winter course, Dalhousie University incorporated PowerLab LabTutor Teaching System into their Introduction to Pharmacology course directed at senior undergraduate and graduate students. The change to PowerLab LabTutor System replaces their traditional data acquisition system, saving time with the simple setup and allowing a full spectrum of laboratory exercises to be offered to students. The PowerLab LabTutor System made a big difference with the “simplified calculation, graphing interface and the ability to capture a segment of the recording for use in the lab report” said Professor Downie.

Professor Downie runs the whole course with the assistance of a departmental technician. The course was designed with “students receiving background document in advance of the lab with no formal pre-lab talk/quiz needed... a three hour lab period working independently in their groups...taking their report pages home on flash drives, expanding on questions, and submitting the report eight days later for me to mark” said Professor Downie.

Professor Downie used LabAuthor extensively in this course to modify and create new LabTutor experiments. Although using LabAuthor for the first time was time consuming, ADInstruments “excellent customer service environment... and participation in several WebEx seminars have been very useful” said Professor Downie. In future, Professor Downie hopes to work together with ADInstruments “to develop LabAuthor further to facilitate programming and to permit more extensive analysis”.

The response of students to the new LabTutor Teaching System have been positive with students liking LabTutor intuitive interface, step by step instructions on performing experiments, simplified data collection and pre-formatted lab reports with integrated questions, graphs and tables. Students also found background information provided a better understanding of course materials and useful when generating lab reports and answering questions. Dalhousie University plans to expand and increase the intake of students for the Introduction to Pharmacology Course in future.

Background information

Course: Introduction to Pharmacology

Educator: Professor John Downie, Professor of Pharmacology

Students using PowerLab LabTutor systems: Fourteen 4th year undergraduate students and one graduate student

Experiments performed: Ligand binding, isolated smooth muscle and whole animal cardiovascular autonomic pharmacology.

Lab time for each experiment: Three hours for experiments and data analysis. Background information on experiments is given beforehand and lab reports are allowed to be completed at home and handed in the following week.

Interview with Prof. J. Downie

What courses use LabTutor and how many students are in the course(s)?

We have one laboratory course, developed for the 2009 winter term (Jan-Apr). It is directed at senior undergraduate and graduate students. Our lecture course, Introduction to Pharmacology I is a prerequisite. I have incorporated LabTutor as an integral part of the course. At present we have a maximum capacity of 18 students, but in the term just coming to a close (our first) the enrolment was 15.

How many PowerLabs do you have and what other ADInstruments equipment do you have?

We have 5 PowerLabs and use 5 of them at this enrolment. We also purchased Bridge amps and some pressure transducers at the same time as the PowerLabs. We considered getting organ baths but found the only design we liked (jacketed) too expensive and are using various jacketed labs found around the department. I have 2 older MacLabs, one I used until about 3 years ago.

When you were looking for data acquisition systems which ones did you evaluate?

We considered BioPac and DATAQ based on the experiences of some other institutions.

What were the key factors that made you choose ADInstruments products?

I found DATAQ totally unsuitable. BioPac was of comparable price but the student software offered by ADI (LabTutor) was a far superior student interface.

Can you describe the implementation of the PowerLab data acquisition system in the lab? (Laboratory setup, number of staff running labs, how the labs are run.)

Our lab tables serve 2 student groups of 3 students (each group has a PowerLab). The course is a one-term course consisting of 12 lab exercises, one afternoon per week. The intention was to use the PowerLab for 8 exercises. Programming problems with LabAuthor reduced that number to 6. Only 1 exercise used an ADI-written LabTutor experiment (the Introduction). I am the course director and I run the course with the assistance of the departmental technician. I have extensively adapted ADI's LabTutor Experiments in most cases. Students receive the background document in advance of the lab (via a digital learning area on the university server called Blackboard Learning System (BLS)) but they have no formal prelab talk, or pre-lab quiz. We only have a 3-hour period for the lab (though most have run 4 hours or more). The technician and I set up the tissues/animals. The students are able to work in their groups independently and the tech and I circulate to provide some assistance and answer questions. The students take away their report pages on flash drives, expand on some questions, and submit the report 8 days later via BLS. I mark the reports.

How long have you and/or the university been using ADInstruments data acquisition systems?

For teaching, this term's course is my department's first use of ADI instrumentation. I believe that some equipment is also used in the Psychology department, and a colleague in Anatomy & Neurobiology uses ADInstruments equipment for research purposes.

What difference has PowerLab made for you, your students, and the courses you run?

We previously used Grass Polygraphs. Our technician appreciates not having to unclog pens, fix paper jams etc. I appreciate not having to switch out preamplifiers that won't balance etc. Physically, set-up is very simple so takes relatively little time. Also, as the room used for the lab has other use, so the fact that take-down doesn't take very long is also a plus.

What type of experiments are your students conducting with LabTutor systems?

The types of experiments in which LabTutor is used are: ligand binding, isolated smooth muscle, whole animal cardiovascular autonomic pharmacology. It was NOT used for drug metabolism, neuropsychopharmacology, and one whole animal pharmacology simulation.

Can you describe how the course was run before the use of LabTutor systems?

The students were issued with a lab book that introduced each exercise. Various faculty members were responsible for setting up exercises, writing the section of the lab book and presenting the pre-lab talk. Graduate students served as demonstrators and markers. Students submitted formal lab reports. It has been many years since we offered such a full spectrum of laboratory exercises as we are this term.

What particular features of LabTutor software have made a big difference?

Simplified aspects like calculation and graphing. The ability to capture a small segment of record to use in the report.

How have LabTutor and PowerLab systems saved you time?

Well, in this set-up year using LabTutor has probably cost me time because I've been programming almost all the labs. It might not have been any different if I was writing a conventional lab book from scratch, however, I would be using a secretary to type up the lab book.

Running the labs with 2 people has been no problem. I think once the exercises have been established it will be relatively easy to modify them with LabAuthor.

Can you comment on the students' experience with LabTutor systems?

Not yet. We will get them to comment on the whole lab experience at the end of the course. Informal comments collected about halfway through the course have all been positive. From my observation, the students certainly find the environment easy to navigate. They find the data manipulations (working with the trace, expansion, scaling, cursors etc) vary intuitive (as do I).

How does LabTutor help students with understanding scientific principles or learning goals?

It should be possible to direct them to an understanding of the underlying principles when the data collection and processing is so simple. To a large extent, this depends a lot on my ability to structure the LabTutor exercise to achieve these goals. I'm working on it and expect that I'll be revising the exercises for a few years (but at least that's not a difficult task).

What are your future plans for LabTutor? Do you intend to increase the number of systems that you use, the way you use them etc?

We hope to increase enrolment next year and hit our current maximum of 18 students. We originally planned for a maximum of 24 students (would require 2 more PowerLabs). If we consistently had to turn students away, we would consider expanding even further. Another possibility would be to offer the course in 2 sections (would be twice per week).

Workshops: Would you be interested in hosting a summer workshop in 2009? If so are there any special topics you would want to cover?

I think it is a bit early for me to contemplate trying to host a workshop. Halifax would be a great location, though. Desirable destination and good weather.

LabAuthor: Have you modified existing experiments with LabAuthor? Have you created a new experiment?

Yes, I have developed several experiments as extensive modifications of existing LabAuthor Experiments. Yes, I have created a couple of new LabAuthor experiments.

Please comment on the use of LabAuthor: Was it easy to use? Had you used another HTML editor? How does LabAuthor compare?

This is my first experience with an HTML editor. I would say that programming with LabAuthor is fairly straightforward but also produces a fairly straightforward exercise. It still takes me a fair amount of time to set them up. I've found it more difficult to do things that are the equivalent of what I might have set for students to do in more typical free-form lab reports. So the structure of the report page is both a blessing (in convenience, for example) and a "curse" (places limits on data analysis).

Support: Do have any comments you would like to make about the service from ADInstruments

I'd like to congratulate ADInstruments on developing an excellent customer service environment. I had great rapport with sales staff. Your educational consultant, Wes Colgan, has been a godsend – always approachable, helpful and interested in how I'm trying to use LabTutor. I have participated in several WebEx seminars and they have been very useful.

Would you like to make any extra comments you would like to make about LabTutor and PowerLab systems or ADInstruments?

I hope that we can work together to develop LabAuthor further to facilitate programming and to permit more extensive analysis.

Final question. Would you recommend LabTutor to other educators?

Yes, certainly.

Biography

Professor John Downie is a professor of pharmacology and assistant professor of urology in the Faculty of Medicine of Dalhousie University for over 25 years. As a previous MacLab user, his research interest is on the central nervous system control of urinary bladder function. As a Professor in the department of Pharmacology, he trains graduate students and postdoctoral fellows and teaches in a range of courses including medical, dental, pharmacy, and undergraduate science students.